SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

EXHAUSTED COAL FIELDS—No. IV.

It may some day happen that "testing companies" may become the fashion, companies basing their commercial success purely upon scientific principles. It is what we witness every day of our lives, that men back their opinions by a wager. Testing companies, however, would proceed upon a somewhat more regular course. Thus the principle element of success would be a committee of sound thinking and experienced geologists, equivalent, in fact, to the medical boards of an insurance company. Proprietors would submit their properties to them, a charge for the inspection and report would be required, and if favourable the company would look for a premium suitable to the conditions of the case, whether it be a sum paid down, or at intervals, or a share in the royalties, to be derived from the property. They would expend a certain sum, to be agreed upon, in making the proof. What is not practicable for an individual to do would be within reach of the means of such a company. There are many more absurb schemes started in the world than this; it has the advantage of being based upon true scientific knowledge. Time will teach us all how to set an egg on its end, and, perhaps, Parliament will help forward the testing of supposed deep-lying coal fields by some enactments which will facilitate schemes for the purpose. We are somewhat astonished, however, to find that the exhausted coal districts are so backward in helping themselves. Take, for instance, South Staffordshire and Shropshire, the greatest undertakings in search of coal are puny in comparison with the efforts made in other portions of this country, as at Dukinfield, Wigan, Monkwearmouth, Pendleton, and a score more that could be mentioned.

When we examine carefully into the subject of "deep sinkings and borings," and enquire what has already been done in other countries in this branch of mining, we are compelled to confess, be the cause what it may, that we have not particularly distinguished ourselves. The boring at Minden Saltworks, in Prussia, is 2231 ft. deep. The mine of Eselschacht, in Bohemia, is 3778 ft. deep. An artesian well at St. Louis, in America, is 3843 ft. deep. Borings were made near Creuzot, which were stopped at a depth of 3018 ft. In China we find there is a shaft sunk to the depth of 3197 ft. in seeking for a supply of carburetted hydrogen for heating the salt pans. In the province of Hainault, in Belgium, there is a coal mine 3411 ft. deep. The deepest coal mine in Great Britain is that at Dukinfield, near Manchester, which is 2151 ft. deep. The Monkwearmouth pit, in Durham, which is sometimes spoken of as the deepest coal pit in this country, is 1590 ft. I need not multiply instances of great depths to show that we have not yet accomplished what has been done in other countries in this respect. We may, however, reasonably ask the question why in such districts as South Staffordshire and Shropshire there should be any lament as to the coal supply while such adjacent districts as are expected to contain it remain unproved? The deepest shaft in South Staffordshire is, probably, that sunk at Manor Farm, 428 yards; and in Shropshire, the Granville pit about 410 yards. When we consider that the coal measures which we are desirous of proving contain as many feet of coal at the least as the exposed portions, and in some parts grouped together as a Ten-yard coal, there seems to be quite as much mineral wealth to tempt us in the speculation of testing as there has been in other cases of deep sinking. It is an old adage, "Those who live longest must fetch fire furthest;" but it is equally true that those who have had comforts and indulgencies placed easily within their reach are the least inclined to help themselves when they are taken away, and may we not add are the loudest in complaining of their absence. It appears to us, as we have before stated, that it is a case which requires the combined action of colliery proprietors and landowners, for which purpose a clear and comprehensive view of the geology of the district to be proved should be arrived at, and then a complete organisation secured. It is well enough to discuss the scientific part of the subject before learned societies; it has been sifted and riddled till there is nothing left to be done. We have no facts left to deal with. We can only obtain them by a trial. Surely a summing up of the evidence and the opinions arrived at may be put together in such a shape as to be intelligible even to the non-geological mind, and reduced to a moderate-sized pamphlet, costing, perhaps, 1s. A free circulation of such a publication would contribute much to help forward the desired end.

Perhaps it may be said that coal is at present so cheap that it would not pay to win it from great depths. That is true if the same royalties be required for such deep coal as for that which is shallow. The stimulus in these enterprises will be a small royalty. There seems to be some possibility of even a sudden collapse in our coal supplies, arising from the fact that many large undertakings are so burdened by excessively large minimum payments for royalty that they are compelled to produce an immense quantity in order to secure to themselves the benefits of their leases, thus they are forced into vast "outputs" of coal, and an extremely rapid exhaustion of the property. At the same time a market must be obtained, which is so far over supplied as to keep down the value of the coal. When coal is proved to exist in a property it is more beneficial to all parties that a good royalty per ton be paid and a moderate minimum, than a small royalty with a very large minimum. The great object which we have in view as a nation is, no doubt, a supply of a coal at a moderate price. Large minimum royalties contribute materially to this end. It will be, however, at the cost of future generations, when the readily worked coal is exhausted. But irrespective of the forced "outputs" we must remember that in all enterprises, whether they be in the direction of mining, the "ready penny" is what we are all aiming for. Coal seams lying in the ground are nothing more than unproductive capital. If they were raised, brought into the market, and sold they would be converted into a shape which we usually called "realised"—*i. e.*, an available security in its most approved sense. There was a time when people scarcely allowed the idea of the reproductive power of money to enter into their thoughts. Now we may venture to say there is no commercial enterprise in which that element—otherwise called interest—is not imported. That is, no doubt, one reason why large royalties are commendable as far as the lessor goes. He may capitalise his property and make it thenceforth reproductive. But this in reality forces on the lessee to glut the market, and he is, in consequence, unable to realise the profits he otherwise would, and consequently to pay large royalties. Good royalties and small minimums are more beneficial to the lessor and lessee, but not to the public. The nation really derives the benefit when the opposite conditions obtain—*i. e.*, for the present, we cannot say for the future. If, however, our national wealth is dependent on cheap coal by means of which we are enabled to compete with and outvie our neighbours, if our national prosperity is dependent on the present conditions of things—*i. e.*, shallow and cheaply-produced coals introduced at very low rates—we may safely say that it is a short-lived prosperity, for we are very rapidly exhausting them. We are rapidly approaching that condition of things in which either the landlord, the tenant, or the public must make a considerable sacrifice in their present advantages. The tendency, so far, is to make up for small profits to the tenant and small royalties to the landlord by a terrific output, as mentioned in the Supplement to the *Mining Journal* dated Dec. 10, when in speaking of the Cambois Colliery, in Northumberland, your correspondent mentions the astonishing output from one shaft of 1600 tons per day. The desire and aim of all colliery proprietors is naturally to produce as much as possible, and thus stimulated the market is so far supplied as to keep down the price of coal. What would be the effect on the manufacturers of this country if coal instead of being obtainable at 7s. to 10s. per ton were only to be purchaseable at 15s. or 20s.? Yet such is the prospect before us, unless improved machinery and steam can make up for the deficiencies of shallow coal. It is somewhat singular that even in the year 1789 this anxiety about a future coal supply manifested itself (*vide* Williams's "Mineral Kingdom," vol. I., p. 184). He suggests the interference of the Legislature to prevent the working of our home collieries until we have utilised the coal fields of the colonies. The day may come when steam coals will not be exported, or restraints put upon the owners of such collieries, because of the requirements of the British navy, as once the consumption of wood was checked on the same grounds. Taking the Shropshire or Coalbrookdale district for an example, since we happen to have records in our possession, let us call attention to the fact that about the time Williams wrote the price of coal was from 4s. to 6s. at the pits, as stated in the original report on Shropshire to the then Board of Agriculture; but in Plymley's report, written in 1802, it is spoken of as being from 8s. to 10s., though that referred more particularly to the Clee Hill field. He says the price had risen considerably, and we may suppose for argument sake that it was from 6s. to 7s. in the Coalbrookdale district. The average value of coal at the pit's mouth is not much more, if any more, than this at the present day. There are, however, other elements than the cost of winning showing themselves which may contribute to the cost of coal in the future. I mean principally the labour question, especially that form of it which assumes to dictate how the mines shall be worked. Think for one moment of the additional cost of ventilating some of our large collieries in such a manner as to enable the collier to use a naked candle. We should laugh at the suggestion were it not that it was the principle point insisted on by the representatives of the North of England Union at a meeting of miners of Monmouthshire and South Wales, and referred to in the *Mining Journal* of Dec. 10. It is not our intention to discuss this aspect of the question here, but to stimulate the parties most concerned in proving the prospective coal fields.

COLLIERIES IN NORTH DURHAM—THEIR WORKINGS AND MACHINEEY.

THE MARLEY HILL COLLIERIES.

These collieries—forming part of the mining property of Mr. John Bowes and partners, of which Mr. C. M. Palmer is the managing partner, and who has been the principal in uniting these important collieries under one mining company—comprise Marley Hill, Andrew's House, Byermoor, Burnopfield, Pontop, Kibblesworth, and Springwell Collieries, all of which are in operation, and under the management of Mr. C. Berkley. The area of property leased in the Marley Hill section by this company is very great. The output of coal last year was about 900,000 tons. In the Marley Hill and Byermoor district old pits and workings abound, principally in the Main coal and another seam above it. Some of these workings date as far back as the year 1600. The bords are usually found to be from 4 to 6 yards, and the pillars 2 yards in width, or only of sufficient strength to support the strata above. Between 1632 and 1649 wooden railways first came into use in this coal field. In 1794 cast-iron rails were partially used; and in 1815 malleable iron rails were introduced in place of cast-iron, These improvements, and the adoption of the locomotive principle of traction on railways in the year 1826 for mineral traffic, have led the way to the opening out of the lower seams, in the district around Marley Hill particularly. The coal produced at Marley Hill, Andrew's House, Byermoor, Burnopfield, and Pontop Mines being peculiarly suited for making coke of high quality, and to this fact may be ascribed the impetus given to the development of the lower coals at the above-named collieries, which had not until the year 1840 been sunk to, or their value fully known. The modern practice of mining in this district, though still on the bord and pillar system is widely different from the old practice; the pillars are made of large size, and subsequently removed in lifts as wide as possible, so as to secure the largest percentage of merchantable coal; though in working the seams at Marley Hill, Andrew's House, Byermoor, Burnopfield, and Pontop Collieries—being coking coals—producing large coal is not the primary object. These mines produce little, if any, fire-damp; in Kibblesworth and Springwell Mines fire-damp is produced, most freely in the latter, requiring all the precautions and care available for its security to be observed. Furnace-shaft ventilation is the rule at all these mines. Hauling by underground engines is largely adopted, which will be found hereafter fully described. The heapstead, roofing, and screens at these collieries are constructed of wood. Eight screens are erected at Marley Hill, four at Andrew's House, eight at Byermoor, and a proportionate number at the remainder. A feature in connection with these erections, and very valuable in subduing fire, is carried out at the whole of the collieries—by shutting off the feed of water to the boilers, and making the boiler-feeder available directly as a fire-engine, taps and hose being provided at the proper places. The whole of the boilers are plain, fired by hand, uncovered, and have each a bottom and two side flues, commonly called wheel-flues.

Marley Hill Colliery.—Two pits are sunk to the Bustybank seam, 2 yards of strata between them, 11 ft. in diameter, 74 fms. in depth to that seam. Both pits are downcasts, and used for raising coal; they have been 28 years in operation. Two winding-engines and one pumping-engine are erected. That at the Bustybank pit is a lever winding-engine, of 26-in. cylinder, 6-ft. stroke, 11½-ft. cylindrical drum, raising about 500 tons of coal and 30 tons of fire-clay daily, with two-decked cages, each cage carrying two 8-cwt. tubs. That for the main coal pit is a beam direct-acting winding-engine, of 24-in cylinder, 6-ft. stroke, 9-ft. cylindrical drum; it raises about 260 tons per day from the depth of 33¼ fathoms, in single-tub cages. The pumping-engine—double-acting, non-condensing—has a 32½-in. cylinder, 5-ft. stroke, furnished with cross-head, slide bars, and side rods to a pumping beam below, 25 ft. in length, extending to the Bustybank pit. Water is raised in one 12-in. bucket lift of 41 fms., from the Bustybank to the Main coal seam, from whence it flows through old workings in the latter out to the day. This engine goes day and night, at the rate of 8 strokes per minute; it works also a 7-in. forcing-lift, 5-ft. stroke, from the Main coal to the top of the pit, for supplying the coke ovens. Nine plain boilers supply these three engines, and two underground engines, with steam, at 30 lbs. pressure; they are all in connection. Six of these are 32 by 6 ft., three 40 by 5½ ft. The boilers are fed by the pumping-engine usually, or by the others if required.

Proceeding down to the Bustybank seam, there is found in operation one of the most extensive engine planes of this district. The hauling-engine in connection with it is placed 20 yards north of the pit, under the road; it has two 20-in. horizontal cylinders, 3½-ft. stroke, three wheels of equal size, working two drums, 6 ft. in diameter, 2 ft. in width, each on its own shaft, and moved by slide carriages, fly-wheel on the main shaft. The engine plane is worked throughout by main and tail ropes; it extends 1½ mile northward, in a straight line; at the northern extremity a return-wheel and a pump are fixed, in the Gibside district. At one mile from the shaft a branch, 200 yards in length to the west, is fed from the Birdhill district, now working back. At 1¼ mile from the shaft another branch proceeds west, 1100 yards in length, to the Fellside district, making its distance from the shaft about two miles, for which a corresponding length of main rope, and four miles of tail rope, are required. A train of 70 tubs is pulled in together, and the same number outwards; 15 minutes is taken for the journey out, which gives a speed of 8 miles per hour. Return-wheels are placed at the extremity of each west branch. The gradient of the north plane is 1 in 140, rising inwards for three-quarters of a mile; the remaining three-quarters falls inwards at the same inclination. The return-wheel at the northern extremity is two-grooved, one groove for the tail rope, the other for an endless rope, which works the pump, placed about 30 yards from the wheel. This is a 7-in. double-acting plunger pump, 3-ft. stroke, connected to 6-in. main pipes, 250 yards in length; the power is increased by toothed wheels, in the ratio of 1 to 2. The several hauling ropes are changed at the two westway junctions, when a change is required, and a set is run into and drawn away from one district consecutively. The whole of the pits drawing is supplied by this engine. Section of the Bustybank seam, in the Fellside district, at face of west bords:—

1.—Blue metal, good roof.			
2.—Good coal	2 ft.	5¼	in.
3.—Shale band	0	3	
4.—Coal	0	4¼	
5.—Shale band	0	1	
6.—Good coal	1	3 = 4 ft. 5	in.
7.—Fire-clay, good quality.....	1	6	Taken up in bords.
8.— ditto inferior.			

The general dip of the measures is eastward, about ¼ in. per yard. The cleavage runs nearly north and south; the bords are driven usually west at right angles to it. The only gas found in this mine is carbonic acid; it proceeds from the goaves. Powder is used in the whole workings—no lamps are used. The holing is made under the lower band, but as it is not a great object here to make large coal where so much of it is required for coke making, the perfect separation of the bands from the coal is the principal consideration. A panel of 15 bords is being driven westward in the Fellside district, the wagon road being in the middle; this road is flanked by a 20-yard wall and air-way on either side, and further by a wall 50 yards in width; beyond this there are five pillars on either side: on the south side these are 25 by 20 yards; they are subsequently worked away after the whole in 5-yards lifts. The five pillars on the north side are 50 by 20 yards, and are left for a later period. There are 5 horses and 25 small ponies employed in this seam.

At the Main coal pit the output of coal is about 260 tons per day. The Main coal has an average thickness of 4 ft. 2 in. of clean coal, with a good roof; the fire-clay below is of inferior quality. A hauling engine is placed in this seam, 15 yards east of the pit by the side of the plane; it has two 14-in. horizontal cylinders, 3-ft. stroke, three wheels of equal size. Fly-wheel on main shaft; two drums, 6 ft. in diameter, 2-ft. wide, each on its own shaft, and moved by slide carriages. The engine plane proceeds east from the shaft a length of about 1100 yards; about midway in this a branch proceeds north-east 400 yards, and from the extremity of the east plane a branch goes south 660 yards in length; the whole of these are worked in and out by tail and main ropes in the usual manner. The main rope goes over a wheel fixed close to the shaft, by which the laden tubs are pulled up to it. The whole of the Main coal drawing is supplied by this engine, and 36 tubs are run with each journey.

The air in circulation in the Bustybank seam is....		37,000	cubic feet per minute
ditto	ditto Main coal	22,000	ditto
Total for Marley hill		59,000	ditto
The air in circulation at Byermoor, Bustybank		24,000	ditto
Total		83,000	ditto

The ventilator for these three mines is the Byermoor upcast pit, heated by a large furnace at the bottom of it.

Andrew's House Colliery has been about 28 years in operation. The coal and pump shaft, in one, is also downcast, 11 ft. in diameter, 46 fms. in depth to the main coal seam. The upcast pit, with a furnace at the bottom of it—about 300 yards south of the coal pit—gives this colliery an independent ventilation. The plant includes one lever winding-engine, of 28-in. cylinder, 5-ft. stroke, 9-ft. cylindrical drum: the front lever is extended through the wall, to utilise the engine, if need be, for pumping. About 360 tons of Main coal is raised daily in single-tub cages, with tubs of 7½ cwts. One 34-in. double-acting beam pumping-engine, 7-ft. stroke, goes day and night at the speed of 12 strokes per minute; it has a 28-feet cast-iron beam, balance-beam on the surface. Water is raised by one double-lift of 41 fms., in the pit, 12-in. buckets, both pumps delivering into an off-take adit,

5 fms. below the surface. These two engines and an underground engine are supplied from seven plain boilers, 32 by 6 ft., at 30 lbs. pressure. The boiler-feeder is one of Cameron's 6-in. inverted engines; the other engines can also feed if required. The hauling-engine, placed immediately at the bottom of the pit, has two 16-in. horizontal cylinders, 3-ft. stroke; it works with four cog-wheels and two 5-ft. drums. The main-rope drum is worked by wheels in ratio of 1 to 2, the tail-rope drum by wheels of equal size. Each drum has its own shaft, and is moved by slide-carriages; fly-wheel on the intermediate shaft. This engine hauls on a plane about 1 mile in length, nearly level, half of which is south-west from the pit, the remainder is a continuation in a south direction. The plane is worked throughout by main and tail ropes; 36 tubs are run at once. The pit is supplied altogether by the hauling-engine. This colliery is so heavily watered, from the nearness of the Main coal to the surface in an adjacent valley, and, probably, from the existence of old water-logged workings, that it is necessary to supplement the pumping-engine with other pumping-machinery. Connected to the hauling-engine are two 5-in. double-acting plunger-pumps, 3-ft. stroke, which force water up the pit in 5-in. mains; these are in operation whilst the engine is hauling. Another pumping-engine is placed at the extremity of the plane; it has one 12-in. horizontal cylinder, 2-ft. stroke; wheels in ratio of 1 to 2, and works one double-acting pump, 9-in. plunger, 18-in. stroke, going day and night, at the rate of 30 strokes per minute. The engine and pump are at the bottom of a pit, 12 fathoms in depth: the water is forced up the pit in 9-in. mains. Steam is supplied from a multitubular boiler, placed near the engine, the heat and steam escaping through the pit.

Byermoor Colliery has been eight years in operation. The coal pit, 11 ft. in diameter, 83 fms. in depth to the Bustybank seam, is also downcast. The upcast pit, 150 yards distant from the downcast, as before stated, is the ventilator for this and the Marley Hill Mines. A lever winding-engine, of 38-in. cylinder, 6-ft. stroke, 17-ft. cylindrical drum, raises about 500 tons of coal daily, with two-decked cages; each cage carries two 8-cwt. tubs, and runs on two wire-rope guides. Water is raised at nights by the same engine; iron tubs—each containing 400 gallons—replace the cages, and run on the guides. An engine on the surface hauls coal to the top of the coke-ovens, and pumps water to a reservoir, for use in coke-making; it has one 16-in. horizontal cylinder, 4-ft. stroke; one 5-ft. drum, for which there are wheels in ratio of 1 to 2; but the pumping is direct from the main shaft. The Busty-bank seam is 5 feet 9½ inches in height, including 5½ in. of shale, in two bands, or 5 ft. 4 in. of good coal. The fire-clay underneath is of good quality. The Brockwell seam is sunk through at this pit, 10 fathoms below the Busty-bank. Section of the Brockwell seam:—

1.—Coal, inferior	0	ft. 6 in.
2.—Shale band	0	4
3.—Top coal	1	2
4.—Shale band	0	3
5.—Bottom coal	1	7½=3 ft. 10½ in.
6.—Bastard fire-clay.		

Burnopfield Colliery.—One coal pit, 12 ft. in diameter, which is also downcast, was sunk twenty-seven years ago. Depth, 90 fms. to Bustybank, and 48 fms. to Main Coal seam. The upcast pit is 400 yards distant from the downcast, and with a furnace produces ventilation for the mines. A beam-engine of 31-in. cylinder, 6-ft. stroke, raises coal by day, and pumps water at nights; the engine draws coal from both seams, the cages stopping at the upper seam in going up; about 550 tons are raised per day in two-decked cages, two tubs in each cage. The beam projects over the cylinder, and is from the end connected to the pumping-beam below; water is raised in one lift of 42 fms., 12-in. bucket, 3-ft. stroke; from the Bustybank to the Main Coal seam, from whence it flows out by an adit.

Pontop Colliery.—One coal pit, 12 feet in diameter, which is downcast, is sunk to the Main Coal seam, 72 fms. in depth, and an upcast 10 yards distant, with a furnace is appropriated for ventilating the mine. The winding-engine has 31-inch cylinder, 6-feet stroke; it raises about 400 tons per day of Main coal; this seam has been worked about thirty years. An adit level, 2½ miles in length, drains the Pontop Mine, and a large district of mineral property besides; the quantity of water flowing out by the adit in the winter season is estimated to be 6000 gallons per minute. A supply of water sufficient for coking purposes is raised in tubs at night by the winding-engine. The engine for hauling on the surface has a 24-in. cylinder, 5-ft. stroke, it hauls the produce of the colliery and coke ovens to the North-Eastern Railway.

Kibblesworth Colliery.—One coal pit, sunk twenty-seven years ago to the Hutton seam (of the Wear district), depth 62 fms. The Low Main and Hutton seams are each worked, the former as a steam coal, the latter for gas-making. A lever winding-engine, of 26-in cylinder, 5-ft. stroke, raises about 600 tons per day in single-tub cages. The Low Main coal is dropped down to the Hutton seam, and the whole is raised from the Hutton seam level. The coal is worked on the bord and pillar system, candles are used in the whole, lamps in the pillar workings. Ventilation caused by a special upcast pit and furnace. A pumping beam-engine has 30-in. cylinder, 6-ft. stroke. From its shaft end the motion is given to a pumping-beam below; under each end of the latter a pump-shaft is sunk; water is raised in one lift of 52 fms. at each end of the beam, 12-in. buckets, the stroke at one end is 4 ft., at the other end 3 ft., both delivering to an adit 10 fms. below the surface. This engine goes day and night, from 10 to 12 strokes per minute.

Coke-Ovens.—The Marley Hill Company have 805 coke-ovens in operation at Marley Hill, Byermoor, Crookbank, Burnopfield, Pontop, and at Gateshead. Besides these, there are others in operation at Belfast, at Pettycur, near Perth, and others at London, not in use. The ovens are dome-shaped, varying in diameter from 10 to 11 and 12 ft. Small coal is used for burning in the ovens; they are charged in some cases at the door, in others at the top. Main flues and chimneys, about 60 ft. in height, are provided for nearly the whole of the ovens, which serve to prevent the nuisance of smoke, and places the regulation of the ovens more under command. The coke in all cases is drawn by hand. The production of coke altogether at the collieries and Gateshead is about 250,000 tons per year.

Brickworks.—The fire-clay is got principally from beneath the Busty-bank seam, in Marley Hill Mine, and produces excellent fire-bricks. These are used for the construction of the coke-ovens, and for the blast-furnaces, puddling and other furnaces at Jarrow Ironworks. About 40,000 ordinary bricks and lumps are made per week. The clay-mill is driven by a 14-in. vertical engine, with slide-bars. This engine also raises coal up an incline to the coke-ovens, with one drum on second motion. There are four flats for drying bricks, with flues and chimney to each; and seven kilns, each has three fires in front, and chimney, and contains from 6000 to 9000 ordinary bricks.

THE FOREST OF WYRE COAL FIELD.

Sir,—I have been much pleased by the perusal of Mr. D. Jones's interesting remarks on the Forest of Wyre coal field in the last number of the *Mining Journal*. I have known mining operations conducted in the Forest of Wyre for upwards of 60 years; but although the actual thickness of the carboniferous stratum therein be rather considerable, and invaluable as regards fire clays, yet the number of *bona fide* coal seams hitherto proved has, unfortunately, been rather trifling in comparison with many other coal fields, especially the neighbouring ones of South Staffordshire and Shropshire, with which an apparent relationship exists, as all the three coal districts exemplify contemporaneous upheavings, by the multitudinous igneous rocks interspersed among the coal measures, and which thus brought the coal fields to the surface, for our benefit, in ancient days.

I fear, however, the Forest of Wyre must formerly have been located within the precincts of an ancient tidal stream, which possibly extended northward in a narrowed shape, or mere branch, into what is ludicrously termed the "Symon Fault," which appears to have intertered to a comparatively trifling extent with the deep coal field, which I confidentiy expect to extend beneath the various red sandstones lying between the South Staffordshire and Shropshire coal fields.

Mr. Jones appears anxious to ascertain if there be a co-relationship between the Forest of Wyre and the other two coal fields alluded to. I beg, therefore, to remind him that an exposed branch of the Forest of Wyre coal district has been proved in a north-east direction as far as Compton, from whence the coal measures become covered by Permians. A trial further west is desirable; and, therefore, if any parties would like to make such a trial I could let them have a portion of the Earl of Stamford and Warrington's estate for that purpose, about two miles northward from Enville (my native place), where a new colliery may, I trust, prove beneficial to lessees, as the spot indicated lies parallel with a good portion of the South Staffordshire coal field, and a little more than three miles distant from the same; whereas at or near Worksop, in Nottinghamshire, a successful trial was made a few years ago beneath the Permians, at a distance of five miles from the neighbouring exposed coal field.

If anyone entertain doubts in such matters, let him humbly seek the Heavenly guidance, and faithfully trust in the Lord, as we should ever do, for He has kindly provided all good things for our use, and us for His service. Henry Beckett, F.G.S.

Wolverhampton, Dec. 20.

COAL-CUTTING MACHINERY.

Sir,—In reference to Mr. Rothery's letter of last week in respect to the positive falsehoods represented by him, I would simply say that practice has suggested, not from 2 to 6 in., as he would fain have the public to believe, but from ¾-in. grooves to 3-in. grooves. And as for Mr. Rothery saying he came to my place of business to see my machine, I would just say I have no one on the premises that ever gave such permission, and if he did see through my works it was by subterfuge, which no gentleman would practice. F. Hurd.

Albion Foundry, Wakefield, Dec. 22.

INEQUALITIES OF RATING IN STOURBRIDGE UNION.

Sir,—Your able correspondent, who calls himself "Faith," to whom we are greatly indebted for his excellent letter in the Supplement to last week's Journal, has made a mistake in his last paragraph, "a case in point," to which I beg to call his attention: 12,000*l.* is in this case set down as the gross sales, and if 15 per cent. is to be taken off before the rate is made for repairs, &c., which will be 1800*l.*—rather a large sum to keep a small colliery in repair—the gross sum is reduced to 10,200*l.*, and taking 1-12th of that as the ratable value, we get 850*l.* as the ratable value, which at 1*s.* in 1*l.* will give 42*l.* 10*s.* per rate, and in case all property in this parish were justly rated we should do with two rates per annum of 8*d.* or 10*d.* in 1*l.* As a resident in this parish, I am rather anxious for it to be known, that however much we ratepayers may have suffered through coal mines and damaged land not having been fairly rated, all the fault or blame is not due to coalmasters. In the first place, we have guardians who have sat there upwards of 20 years, and who had as long been the Assessment Committee of the Union; these gentlemen, I believe, had heard of the agreement at Worcester, and, as reported by the clerk of the Union to the Chairman of the Ratepayers' Committee, they thought the mines had been rated from the date of the agreement up to the time of the outcry of the ratepayers on the terms of the agreement—one-sixth; and when the Ratepayers' Committee called upon them, and pointed out the grievous state of things in general, they expressed themselves astonished. Nor can the ratepayers justify their own conduct in leaving all to chance. The fact is that every man for years has been content to allow his neighbour to look after the public business, while he has selfishly employed his time in his own business, and when told that his neighbour had done as he had done, and the public business had been neglected, he had nothing to do but grumble at everybody but himself.

In turning to the coal mines once more, I am informed that a committee of these gentlemen was established amongst themselves, with Chairman, &c. These worthies were accustomed to meet whenever a rate was declared, and arrange, after looking over the returns, what each should pay. And a curious system these honoured gentlemen had, as exposed by Mr. Frances Cookson, the agent of Mr. W. O. Foster, at a public meeting, over which the Chairman of the Ratepayers' Committee presided. "In the first place," Mr. Cookson said, "we do not enter for rating anything but large coal (no slack, which is from one-third to one-half the produce of the mine), and we call the coal 3*s.* per ton, and we take a quarter's get of coal, and multiply that by 2, which is equal to a six months' get of coal, and rate on one-sixth of that; and as we have two rates in a year, we by so doing pay on our 12 months' get six months' get of large coal for each rate." (Monstrous!) The above is the substance, as I understood Mr. Cookson at our meeting, of his statement as to the mode of rating. Mark, large coal only to be rated, and although the price ranged from 9*s.* to 12*s.* per ton in the market it was set down at 3*s.*, and only one-sixth of that was rated.

I shall make no comment on this state of things, but join the Chairman, who told the meeting it serves us (ratepayers) right, for not having attended to our own business. Mr. Plant excused the Assessment Committee and the coalmasters, and justly threw the blame on us ratepayers at large, who had been content to let everybody work for us without pay; and because everybody had not done the work to our liking, everybody was a bad man. But the ill and irregular rating of coal mines was not all; it was soon discovered by the Ratepayers' Committee that some hundred or more properties in Kingswinford parish had never found a place in the rate-book. And while one cottage in a row was rated at 6*l.*, another, no better house, in the same row, was rated at nearly double. Fields of land were found in good cultivation not on the rate-book, and building allotments past count. I have mentioned these things, to show that our great want of system in Kingswinford parish, which extends over an area of between 7000 and 8000 acres, and has a rateable value of near 100,000*l.*, is not confined to the rating of coal mines, but extends to every description of property; for instance, three blast-furnaces have been for a considerable period rated on 202*l.* per annum, worth at least 1000*l.* per annum; in short, instances in proof of our want of system and justice in rating are too overwhelming to go into, and we have only to hope that the Chairman of the Ratepayers' Committee will continue with us until we can get ourselves put right. I contend that the ratepayers alone are to blame for the gross irregularities in the rating of this parish. Some of our overseers have never taken the least trouble, not so much as to open the collector's book; they have been forced into office against their will, and left the duties in the hands of the assistant overseer, to do as he has thought fit; and, after all, these men are not slow in finding fault with the Assessment Committee and others. I mention this to their shame, and am glad to say that we are reforming. One Interested.

Brierley Hill, Dec. 21.

STEAM ORE STAMPERS.

Sir,—May we be allowed through the Journal to state that it is to us most extraordinary that none of the gentlemen present at the meeting on Saturday last at St. Austell, when the Royal Cornwall Polytechnic Society's Medal was awarded to Messrs. Sturgeon and Co., should not be aware that so far from the application of the steam-hammer for ore stamping being novel, it is nearly twenty years old. We have now before us a lithographed drawing of such a stamper, and a full printed description of it by the inventor, dated July 28, 1852.

We trust in a very short time to show mine owners and agents that it is not a necessity to leave our own county to obtain steam stamping-engines, which we hope will prove far superior to any yet brought out for the purpose, as in our invention certain hitherto difficult points in connection with steam stampers are, we trust, efficiently mastered.

We shall be in a position very shortly to place full details before the public through the *Mining Journal*. Willoughby Bros.

Redruth, Dec. 20.

A TESTIMONIAL TO Mr. JEHU HITCHINS.

Sir,—A suggestion was made in the *Mining Journal* some weeks ago, emanating as I understand from his friends in Devon and Cornwall, that a testimonial worthy of his acceptance should be presented to Mr. Jehu Hitchins, for the great services he has rendered to *bona fide* and legitimate mining during the last 50 years; and when in Devonshire last week I heard some surprise expressed that the matter had not been taken up in London. I suppose, however, that what is everybody's business is nobody's, and thus good resolutions and good objects often fall through for want of some one to move or second them.

It is with this latter feeling that I now address you on the subject. I have had the pleasure and advantage of knowing Mr. Hitchins intimately for more than 20 years. We have been connected together in several undertakings, and through me, directly and indirectly, he has visited and inspected mines in almost every quarter of the globe. Few, therefore, can testify more to his talents, or to his sterling honesty, than I can; and this must be my apology for thus coming forward to urge upon the mining community that something to cheer his heart in his old age should be presented to him. It is more than 50 years since he first inspected mines in Mexico. He was over three score years and ten when he started in the spring of the present year on a trip through California, to the wild regions of Arizona; and only last week I was astonished to see how fresh he was after a two hours' inspection of a mine, and mounting up nearly 100 fms. of ladders; indeed, if there be one thing that exceeds his unflinching integrity, it is his indomitable pluck.

I shall be happy to receive subscriptions towards the object I have indicated; Mr. Nicholls—Portreve of Tavistock—will receive local subscriptions; and a joint committee will be formed as soon as we ascertain the support we are likely to receive. J. Y. Watson.

1, *St. Michael's Alley, Cornhill, Dec.* 20.

NEW ZEALAND QUARTZ CRUSHING AND GOLD MINING COMPANY.

Sir,—In order to remove a misapprehension which I find exists with respect to the Wire Tramway of the above company now being erected at Coromandel, allow me to state that between three and four miles of wire tramway, with all the necessary appliances, reached New Zealand in February last. The erection of the tramway to connect the company's crushing and reducing works with all the leading claims on the Coromandel ranges will be rapidly completed.

Joseph Simpson, Sec.

GOLD MINING IN BRAZIL—THE TAQUARIL MINE.

Sir,—The following is an extract from a letter recently received from a Brazilian gentleman writing upon the capabilities and value of the Taquaril Gold Mine, in the province of Minas Geraes:—

"I have the pleasure to communicate to you that after vigorous works, directed and executed by Mr. T. S. Treloar, he has finally arrived at the great riches of the mine. Samples taken from different places in the lode are admirable, and Mr. Treloar has communicated for the purchase of a number of shares. All the places explored at the bottom of the mine show gold in large quantities, so that the mine to-day is worth ten times more than was supposed. The stratification is all regular, and the former proprietors seem only to have accompanied the conudos or tubes of gold."

The writer, after eulogising the superintendent for his activity and perseverance, sums up by saying that as soon as the stamps are completed, a work which is being pushed on with all possible dilligence, 1000 oits.=125 ozs. of gold per day will be extracted.

Dec. 20. A Brazilian Miner.

THE TERRAS TIN MINE.

Sir,—In reply to the letter of "Miner," inserted in the *Mining Journal* of last week, I beg to say his note is dictated by a most malevolent and envious spirit. It is quite evident he is not acquainted with the facts relating to, or the *status* of, the mine, but has derived the information he pretends to possess not from any authentic reports of captain or manager. It is equally clear from the diction that he has taken the statements of exaggerating London brokers, they not knowing or caring what they state, and, in many instances, to my certain knowledge, not in possession of, or in a position to supply, the stock they advertise. I trust the manager and secretary of the Terras have something better to do than to reply to anonymous correspondents; at the same time, it may be satisfactory to the public to know that the statements of "Miner" are wrong—that proper meetings of the proprietors have been held, that the secretary is a solicitor brought up to mining business, that the books are strictly kept and audited, that the Duchy returns are regularly made, and that the Terras Mine shares are chiefly held by a few capitalists, who look upon the emanations of anonymous correspondents, such as that of "Miner," as the bark of puppies who cannot bite. The letter was, no doubt, inserted with a view to depreciate the property—if so, the effort of "Miner" has most signally failed.

At a meeting of adventurers, held at Tavistock on the 20th inst., it was requested that the secretary take no notice of anonymous correspondence, but that replies be given to any questions communicated to him, and to afford the fullest information. I take upon myself, however, to state that the Terras Mine will prove by deeds, not words, that both the property and management deserve, and have, the confidence reposed in them.

The next sale of tin for two months will be equal to those returned before, and would have shown a considerable increase but for the continued rains and severity of the weather.

My advice to "Miner" is, if he wish to enlighten himself or the public on facts connected with the mine to become, as I am—

Leeds, Dec. 23. A Large Shareholder in the Terras Mine.

THE TERRAS TIN MINE.

Sir,—In the Supplement to last week's Journal I perceived a letter from "An Old Miner" upon the Terras Tin Mine, attempting to cast an imputation upon the management, and pointing to discrepancies between promises held out and facts realised. Whilst condemning exaggerated reports of properties, whether through the medium of the press or in the form of private communications, I should always be willing to make allowances for the unexpected, and sometimes inexplicable, causes which arise to thwart the best devised schemes of management. I, as a shareholder in the Terras Mine, have taken a lively interest in this property for some time. I have not only studied the various reports which have emanated officially and semi-officially, but have paid two or three visits to the mine, and have satisfied myself, by close personal inspection, that it is situated, along with the East Terras sett, in the very heart and centre of the richest possible tin-producing stuff; and though the sanguine—it may be too sanguine—anticipations of those best acquainted with its capabilities may occasionally be deferred, the element of success is still there, and will be forthcoming in due course. I would now advise "An Old Miner" to forego censure until he is enabled by personal examination to report upon the property, when I feel thoroughly convinced he will attach a very much higher value upon it than he appears to do, and he will then admit that drawbacks, though sometimes inconvenient, are not fatal to ultimate success, and ought not to give rise to a quixotic tilt in the public press. Let him at the same time carefully examine the entire district, and he will, as confidently as I now do, come away with the conviction that not only is the Terras Mine making rapid advances towards appearing upon the Dividend List, but that it is likely to have in the East Terras Mine an immediate neighbour capable of vieing with it in success, whilst it will inspire him with such confidence that he will at once emulate my example, and become A Shareholder in Both Mines.

Dec. 22.

TERRAS TIN MINE.

Sir,—After reading the exaggerated statements concerning the produce of this mine, I de not wonder that "An Old Miner," in the Supplement to last week's Journal, should put queries to the manager. Criticism was *invited* by such statements, and particularly by the statements in an advertisement in the last page of the Journal. It is to be regretted that brokers and others do not adhere to the strict line of the truth. Now, what is the *truth* as regards the yield? The elvan course yields about 8 lbs. of tin per ton of stuff. If the stamp mills reduce 40 tons per day, that will give 320 lbs. of tin per day—or per month of 30 days, 86 cwts.=4 tons 6 cwts.; this, at 70*l.* per ton, gives 301*l.* per month, which will about cover the *current cost*, leaving out the cost of the plant. But the *lodes* certainly hold out a very fair prospect of dividends. The elvan I do not value very highly; but from the lodes I believe early dividends will be given.

The advertisement referred to greatly exaggerates the value of Edwards's lode, calling it worth 240*l.* per fathom, which I doubt—say, instead, 120*l.* per fathom. Although interested parties overstate the value of the mine in order to enhance the price of shares, the mine will, I think, do as an investment *at par*. There is no *extraordinary* discovery. The elvan has been long known to exist there, and was slightly worked on in 1865 for a very short time. Observer.

Truro, Dec. 19.

EAST TERRAS (TIN), ST. STEPHEN'S.

Sir,—The Journal of Saturday last announces the resumption of works in this very ancient mine. I am glad of it. The district deserves attention, and particularly the lodes in East Terras—three or four of which were found stanniferous long before the present generation. I feel very confident, from the size and character of the lodes opened on, and the tin in sight, that at no distant period the company will be in receipt of dividends. J. P.

Ladock Village, Dec. 20.

EAST TERRAS.

Sir,—I am much pleased to learn from the *Mining Journal* that this mine is about to be developed by a limited liability company. I perceive from the report of the meeting held at the Salisbury Hotel, London, last week, that operations will be commenced almost immediately. Having lived in St. Stephen's all my days, the mines in the locality are well known to me, and I am prepared to recommend East Terras. I *know* that three east and west very promising tin lodes run through the sett, because they have been *opened on* by the old men; and about 17 years ago Capt. John Dale formed a company, or partly so, for erecting an engine, &c., but the funds not being forthcoming, the concern collapsed, and the mine has been idle ever since.—*St. Stephen's, Dec.* 20. H. T.

CARN BREA MINES, AND THEIR MANAGEMENT.

Sir,—Having noticed an advertisement in the Journal for a manager for these mines, I infer that our late manager has resigned. There must certainly be some cause for this alteration, and one naturally comes to the conclusion from the existing state of things that other changes would be beneficial: and it would, in my opinion, be far better for the mine if the directors would hold a meeting on the mine, so as to give the local shareholders a voice in the election of chief agent, and by open discussion a great deal of valuable information might be gathered. The board should not forget that the Stannaries Act of 1869 is in existence.—*Redruth, Dec.* 20. A Shareholder.

[For remainder of Original Correspondence see to-day's Journal.]

IMPROVED DRESSING MACHINERY—No. II.

Fig. 1.

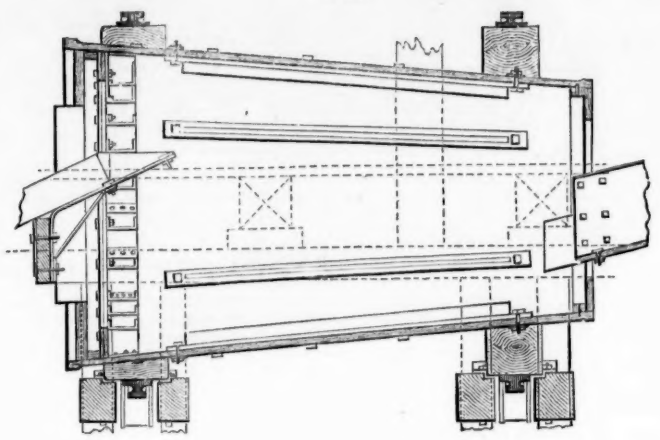
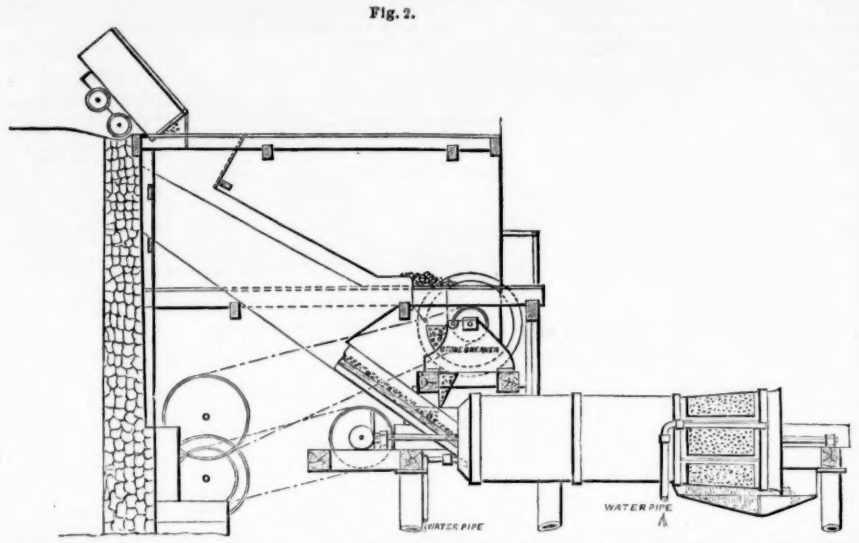


Fig. 2.



WASHING, OR CLEARING TROMMEL.—This is employed in many continental mines, instead of a washing-kiln. Its use seems to depend upon large quantities of argillaceous vein-stuff, necessitating cheap and rapid dispatch; thus, the clearing trommel is frequently adopted for enriching iron and zinc ores, phosphate of lime, and minerals of low value. The cylinder is commonly parallel with the axis. In some instances, however, it takes the form of a double cone, the larger diameter of one end being united to that of the other. When the shell is strictly cylindrical in its form, angle or T iron is fastened to the inside, for the purpose of lifting and dropping the stuff, but when conical the stuff is either washed and delivered by an archimedean screw, or by an arrangement of wrought-iron buckets, similar to those fitted on an ordinary raff-wheel. In cases where rock veinstone is first rejected or reduced to a comparatively small size, the clearing trommel may be furnished with one or more sizing cylinders, for the purpose of dividing the stuff into fine and coarse sand for jiggers, and rough work for the picking-table or crusher. Washing-trommels may be constructed of wood or iron; the latter is, however, the better material, except when copper or acid water have to be dealt with.

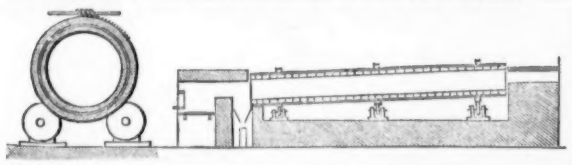
The trommel shown in Fig. 1 is built of wood, and is surrounded by two rings, each of which runs on a pair of carrier wheels. The stuff is introduced by means of a shoot, which may be mechanically tilted or the bottom set at a running angle, so as to deliver the stuff from a hopper provided with a feed-wheel. The T-irons within the shell are about 7 ft. long, and serve to lift and wash the stuff, also to disintegrate any clay with which the stuff may be associated. The buckets at the end deliver the stuff into an outlet shoot, from whence it is free to pass either to a waggon, picking-table, or sizing trommel. The carrier-rings are 3 in. wide, and are centered on wood bushings. The diameter of the carrier-wheels may vary from 10 in. to 15 in. In order to prevent a rapid wear of the wooden cylinder, the latter is lined with stout sheet-iron. The arrangement Fig. 2 shows a clearing-trommel in connection with a stone-breaker and a slide or screen. The stuff is tipped on the screen, which divides it into roughs and smalls. The dradge of the former falls into the stone-breaker, the jaws of which are set so as to correspond with the width between each of the screen-bars. In this way stuff of given sizes, ranging from x—O, is delivered to the trommel, and successfully washed. The shell is 11 ft. long and 4 ft. diameter; the conical portion is 4 ft. long, and at the mouth 4 ft. 6 in. diameter. This shorter portion is fitted with plates, having conical holes, ¼ in. diameter, each hole being one-half of a diameter apart. To the inner side of the cylinder is attached six bars of T-iron, each 4 in. deep. The cylinder is carried on a shaft 5½ in. square, on which is set four bosses, each boss taking six radial bars 1¼ in. diameter. Water is delivered to the inside of the trommel by means of a pipe, and again to the perforated plates by a second pipe. At a mine in which this arrangement has been introduced the screen-bars and stone-breaker are set so as to deliver stuff, viz.:—(1) At the mouth of the trommel, from sizes varying from 25 to 5 millimetres; (2) Through the perforated part of the cylinder from 5 to 10 millimetres.

These two classes of stuff are subsequently divided for the jigging machinery into twelve other sizes, the half-millimetre size being further divided, by means of a classifier, into three additional sizes. The speed of the washing-trommel is 16 revolutions per minute; quantity of stuff washed per 10 hours, from 50 to 60 tons.

For the construction and working of wash-trommels the following general particulars are given:—Diameter of trommel, from 4 to 5 ft.; length, 9 to 10 ft.; angle of conical shell for ordinary vein stuff, 1 in. per foot; for clayey stuff, ½ in. per foot; number of revolutions per minute, 10 to 15; water required from 15 to 30 gallons per minute; quantity of ordinary "small" vein stuff washed per hour, 6 to 10 tons; dirty clayey stuff, 3 to 5 tons; power required per trommel, from one-half to three-quarters of a horse. JOHN DARLINGTON.

THE SELF-ACTING CALCINER.

The improved calciner, to the successful working of which reference is made in the notice of the meeting of adventurers in Wheal Jane, is the invention of Messrs. Robert Oxland and John Hocking, jun. It has been already described in the *Mining Journal*, but as its success is now established, and as the machine is applicable to the roasting of all ores and minerals, it may be interesting again to explain it. It consists of an iron tube, or cylinder, about 4 feet in diameter and 30 feet long, lined with fire-bricks placed on the edge; leaving an internal diameter of 3 ft. 3 in. It is set at an inclination of from a half to one inch per foot, varying according to the nature of the ores to be treated. On the outside, and fastened to it, are three iron rings, on which the tube travels over three pairs of rollers, by which it is supported. On the side of one of these rings are cogs, by which rotary motion is imparted by suitable machinery. The rate of motion is regulated by pullies of different diameters. The fire passes from the fire-place over a chamber into and through the tube, and on into flues covered for a short distance with iron plates, on which the dammed ore is dried before it is admitted in a regular steady stream through a tube into the back or higher end of the calciner. The slow revolving motion of the tube causes the steady advance of the ore by its own gravitation as it undergoes combustion, evolving sulphurous and arsenious acids, so that it is not brought into the sphere of action of the stronger heat until those constituents which cause the tendency to crust have been driven off; and the ore is consequently preserved in fit condition for the completion of the oxidation of its metallic constituents as it is gradually brought nearer the fire. In the interior of the tube are longitudinal projecting ledges, which lift the ore for some distance above the sole of the furnace, and then project it through the passing stream of heated gases. This



constant perpendicular revolving motion is of the greatest importance, as every particle of the ore is kept incessantly in motion, and is thereby brought in contact with the oxygen of the heated gases passing along the tube. The calcined ore is discharged in a continuous stream into the chamber between the fire-place and the front end of the tube. At the back end of the tube "baffle" plates of fire-brick prevent any escape of ore into the flues.

The whole arrangement may be understood by reference to the annexed drawings of a transverse section of the tube and longitudinal section of the whole apparatus. The heat evolved by the combustion of the sulphur and arsenic is made available, so that fuel is employed only for the completion of the operation. The heat from the fuel has to traverse more than double the distance that it has to do in Brunton's calciner before it escapes into the flues, and the tube presents nearly double the amount of heating surface. In the old burning-house oven and in Brunton's calciner the crown of the furnace is much more highly heated than the sole, and great loss of heat is the consequence; but in this furnace the heat absorbed by the crown is most advantageously applied by its being rendered in succession the sole of the furnace. As it passes down and under the charge the excess of heat is given off to the charge, and absorbed by it. In the case of the treatment of arsenical ores in the furnace, the evolution of the arsenious acid at a minimum temperature is a matter of great importance, as the rapid and effectual condensation of it in the flues is greatly facilitated.

PRECIOUS METALS AND PRECIOUS STONES—No. III.

The other transparent minerals used as gems differ from diamond in being binary compounds, as sapphire and amethyst, or consisting of three or more elementary substances, of which the chief are oxygen, silicon, aluminium, magnesium, glucinum, with fluorine, and traces of iron, manganese, and chrome; while in those substances which are more or less used in jewellery, and which are generally opaque and amorphous, some additional elements are found, as sulphur, carbon, copper, calcium, phosphorus, and the organic substances, as amber and jet, which are composed of carbon, oxygen, and hydrogen, and the bone turquoise, or odontolite, consisting of phosphorus, carbon, oxygen, calcium, iron, and fluorine.

The next important mineral substance after the diamond are the transparent and coloured varieties of corundum, which consist essentially of alumina, and to which oriental stones from their hardness and brilliancy, the term *precious* was formerly restricted. According to their colour they have received various names; the indigo, or pale blue, is the Oriental sapphire, cochineal red the Oriental ruby, yellow the Oriental topaz, violet the Oriental amethyst, and the asteria, or star sapphire, which has a chatoyant appearance. The sapphire varies much in quality and value, according to its colour, those of the rich velvet blue being of the most value. When the ruby attains the size of 5 or 6 carats it is considered of far higher value than a diamond of the same weight, and is more highly esteemed. Besides the transparent varieties, there is the translucent and cleavable one, known as corundum, which is largely used for grinding glass and other substances, and when prepared with shellac is made into the files used by dentists; the granular impure corundum is the emery, and is extensively used for various purposes of polishing, when reduced to coarse powder by stamping. Besides being cut as gems, sapphires and rubies are largely used for balance holes in watches, and are prepared for this purpose at Geneva, at a less cost than in London. The best rubies chiefly come from Ava and Pegu, the sapphires from Ceylon, at least those which are used for jewellery, usually in the beds of rivers, where generally the finest stones occur, although they are also found in various crystalline rocks. Corundum is obtained from the Mysore district, from Ava, and Malabar, and the more impure variety, emery, from Asia Minor, the Greek islands Samos and Naxos, and from Chester county, Massachusetts, associated with diaspore, magnetite, &c. Sapphire crystallises in modified hexagonal prisms, and is next in hardness to the diamond. Partly allied to sapphire in composition is spinel, which is composed of alumina and magnesia, coloured either by iron or chrome. When of fine colour it is a valuable stone; the deep red is the spinel ruby, the pink variety is the Balais ruby, the yellow is the Rubicelle, and of violet colour the Almandine; the greatest number are from Ceylon, and found in alluvial deposits. Like rubies, they are largely used in jewelling watches, both in this country and Switzerland, but are softer. Spinel is sometimes of neutral blue tint, and has then realised a high price.

The spinel differs from the Oriental ruby in colour and in crystalline form, which is a regular octohedron, sometimes macled, is also less hard, and has a lower specific gravity, which character distinguishes it from garnet, but is superior in hardness to that gem.

The chrysoberyl is an aluminate of glucina, and approaches the sapphire in hardness and specific gravity, but differs in crystalline form and colour, being either pale yellow or various shades of green; it is frequently used in jewellery, also in drilling holes in porcelain and glass, and some stones realise a very high price, and are called Oriental chrysolite. It is found as rolled pebbles in Brazil, where it is highly esteemed, and in Ceylon, and the common ones in the United States and Moravia. Cymophane is an opalescent variety, generally cut *en cabochon*, like the carbuncle.

The next important gems are the beryl, aqua marine, and emerald. They crystallise in hexonal prisms, with the sides striated longitudinally, and are thus distinguished from rock crystal, which has transverse striæ. They are composed of silicates of alumina and the rare earth glucina, which is only found in a few other minerals, as in phenacite and euclase, which last receives a high polish, but from its brittleness is useless as an ornamental stone. The emerald is the deep green, and the aqua marine the pale bluish green variety, and are only used for jewellery; they are less hard and have a lower specific gravity than sapphire. The finest emeralds are from Muso, New Granada, from whence they were brought about 15 years since, and have now become scarce; they are found, but of less quality, in Siberia, the Tyrol, and Norway. Emeralds were frequently used as decorative ornaments for their deities by the Incas, Aztecs, and other peoples of Central America. The beryl is, however, much more abundant, and when transparent is termed aqua marine; the finest are from Siberia, near Madras, India, and Brazil; the less transparent varieties are of no great value, but occur of large dimensions in many localities in the United States, some weighing more than 4 or 5 tons. In this country the beryl is found in granitic rocks with topaz at Lundy Isle, in the Mourne mountains, and abundantly at Donegal, also at Limoges, in France. The topaz is a fluo-silicate of alumina, in rhombic prisms, with striated sides, has a basal cleavage, and is very electric by friction. The chief supply for the purpose of jewellery, comes from Brazil, generally of yellowish brown colour, sometimes of a pale blue, as those from Brazil and Siberia, where the topaz attains several pounds weight. Topaz is very abundant, chiefly in veins, in granite and sometimes forming a rock called topazfels, as in Saxony; it is found in Cornwall, Ireland, and Scotland. The white varieties are generally found as rolled pebbles, at Minas Novas, Brazil, and at Flinders Island, Tasmania; the pink topaz is coloured artificially by exposing it to a low red heat. The garnet group is of next importance, and is, probably, the most abundant of any of the gems, being widely distributed, and is found in granite, many metamorphic rocks, and also in alluvial deposits, where they occur generally transparent; while in the matrix the majority are translucent and opaque. There are three principal groups—the iron, alumina, and chrome garnet, combined with lime, magnesia, and manganese; the crystalline form is a modified dodecahedron, parallel to which it cleaves; it is less hard than quartz, but has a higher specific gravity. The varieties most used are the violet coloured almandine, or precious garnet, from Syrian, in Pegu, the brownish red, or carbuncle, usually cut *en cabochon*. The cinnamon stone, or essonite, commonly known as the iacinth, or hyacinth, is the yellowish brown variety, is chiefly from Ceylon; the Pyrope or Bohemian garnet is also used as a gem. The garnet is largely used for jewelling some kinds of watches made in this country and in Switzerland; and the common garnet is sometimes used for polishing, and as a flux. The zircon, hyacinth, and jargoon are silicates of zirconia, crystallising in square prisms, and have the greatest density of all the precious stones, being 4·6. They vary in colour from an orange or reddish brown (hyacinth) to a dark olive green, and have a lustre almost equalling the diamond, of which it was formerly considered a variety. Zircons occur embedded in granite, syenite, basalt, lava, and are found in alluvial beds in Ceylon. The green coloured variety, under the name of jargoon, are found in Ceylon; these stones are frequently sold as inferior diamonds, the colour being partially removed by heat, and the density being increased after heating, as shown by Prof. A. Church. The peridot, or chrysolite, differs both chemically and physically from chrysoberyl, or Oriental chrysolite, by its less hardness, and in being a silicate of magnesia; although of a soft green colour it is seldom much used in jewellery; it was brought over from the Levant, but the exact locality is unknown. The common variety, the olivine, is very abundant in eruptive rocks.

Of the pure siliceous minerals used as ornamental stones are the crystallised transparent forms of silica, as rock crystal, amethyst, the violet quartz, cairn gorm or false topaz, the yellow or brown quartz, as well as the amorphous translucent and opaque kinds, as chalcedony, agate, onyx, sardonyx, cornelian, chrysoprase, heliotrope, jasper, and the hydrated silica known as opal, which owes its peculiar play of colour to the numerous irregular sized fissures which traverse it, and containing laminæ of air, thus varying in thickness, which reflect the rays of different colours and intensity. Some of the finest opal comes from Hungary, Mexico, Honduras, &c., where it occurs in igneous and other rocks.

Rock crystal is also known as Bristol, Welsh, Cornish, and Irish diamonds, and has occasionally been mistaken for the true gem; it is readily distinguished by the crystalline form, in six-sided prisms, imperfect cleavage, less hardness, specific gravity, and lustre, most of which characters also distinguish the amethyst from the Oriental amethyst, or sapphire, and the cairn gorm from the true topaz. The finest amethysts come from Brazil and Ceylon, but they are found of some beauty in Cornwall and Ireland. Besides being known abroad as the "Bishop's stone," many virtues have been attributed to the amethyst, among others to which it owes its name, that of preventing intoxication.

Chalcedony, agates, and other translucent forms of quartz, chiefly occur as nodular masses in cavities of rocks. Agates, or the banded form, are found in igneous and other rocks in many localities, as Brazil, India, Scotland, and Oberstein, at which latter place they are largely worked, and exported to various parts of Europe, and in this country are sometimes called Isle of Wight and Brighton pebbles. They are coloured artificially, black, brown, red, blue, and green, by certain chemical processes, and present alternate bands of colour, due to the greater or less absorbing powers of the different layers of agate.

Quartz, either fibrous or with some enclosed foreign fibrous body, is cat's-eye, having a chatoyant lustre, while the term avanturine is applied to quartz and felspar, with numerous small parallel cracks, or to disseminated particles of some substance, as mica, &c.; while other enclosed substances, as micaceous iron, asbestus, oxides of titanium and manganese, give to rock crystal the names of Rubasse, Cubit's nets, arrows, or pencils, and Venus's hair-stones.

Tourmaline is occasionally used, as it resembles in colour many of the gems, and has often been sold for them, but is not so hard. The chief value is due to its optical properties in connection with the phenomenon of polarisation of light. It is a boro-silicate, with alumina, iron, magnesia, and fluorine, chiefly found in granitic rocks, crystallises in hexagonal prisms, electric when heated, and of brown, green, blue, black, and red colours; the blue is called Brazilian sapphire, the yellow is the Ceylon peridot, and the green the emerald of Brazil, where it is highly esteemed by the clergy; the red variety, or rubellite, from Ava and Siberia, is a valuable stone, and is cut *en cabochon*, like carbuncle.

Disthene, or kyanite, a silicate of alumina, of an opalescent sky-blue, has sometimes been used for Oriental sapphire, but differs from it in hardness, specific gravity, and its easy cleavage.

Moon-stone, sun-stone, amazon-stone, and avanturine are forms of felspar, a silicate of alumina and alkalies, which owe their value as ornamental stones to certain effects of light produced by their colour, structure, and other physical characters.

The last ornamental stones of any importance are generally compact, amorphous, and opaque, of blue, green, or bluish-green colours. Two of them are comparatively soft—malachite and lapis lazuli: while turquoise equals felspar in hardness. Malachite is a carbonate of copper, and fine specimens are obtained from Siberia and Australia. Lapis lazuli is of an azure blue, and consists of silica, alumina, lime, soda, and sulphur; it is found mostly in altered rock, in Persia, China, and Siberia, and was formerly the source of the beautiful pigment ultramarine, which is now, however, artificially prepared. Turquoise is a phosphate and a hydrate of alumina, coured by copper; it occurs in small reniform masses, of sky-blue

colour, in Persia, where it is highly esteemed, and at Wady Maghara, in Arabia Petræa, where it occurs lining the joints, in a mottled quartzose sandstone, or a short distance from them. The bone turquoise, or odontolite, formerly used in jewellery, is fossil bone or teeth, coloured by phosphate of iron.

The minerals used as precious or ornamental stones differ, therefore, either in their crystalline form or physical characters, most of the transparent ones being among the hardest of mineral substances, and they vary in chemical composition, as follows:—

Carbon	Diamond, carbonado.
Silica, crystallised	Colourless: Rock crystal (so called Welsh, Cornish, and Irish diamonds). Yellow or brown: Cairn gorm, or false topaz. Violet: Amethyst.
Amorphous	Agate, onyx, cornelian, cat's-eye, jasper, opal.
Aluminates	Sapphire, ruby, spinel, chrysoberyl.
Silicates	Zircon, emerald, beryl, aqua marine, moonstone, garnet, chrysolite, kyanite, lapis lazuli.
Boro-silicate	Tourmaline, rubellite.
Fluo-silicates	Topaz.
Phosphates	Turquoise.

FOREIGN MINING AND METALLURGY.

Not only has a want of working miners rendered coal and coke very scarce, and carried their price to a very high rate in the Ruhr basin, but there is also a great want of trucks. Almost all the mines accommodated by the Cologne and Minden line have their warehouses full. It is not uncommon to see workings which are in a position to extract from 5000 to 6000 hectolitres per day furnished with only two or three trucks. As a necessary consequence great neighbouring works, such as Oberhausen, Ruhrort, and Dusseldorf, must become idle by reason of this state of affairs. English coal is making its way up the Rhine, but it is naturally too dear for Rhenish people and industrials. The want of *materiel* on the German lines is, of course, occasioned by its diversion for military purposes by the German authorities. Thus, ten locomotives of the Berg and Mark have recently left, with a corresponding number of trucks, to work French lines which are in the hands of the German troops. Every German railway company is also obliged to place its rolling-stock at the disposal of the Government. This state of affairs is obviously little favourable to industrials; it is one of the sad consequences of the present war.

The state of the Belgian coal trade remains much the same as it was a week or ten days since. Orders continue to arrive from Germany and Holland, but they are not sufficient to prevent the accumulation of very considerable stocks. An extraordinary revival in affairs is looked for as soon as peace is secured, and it is believed that, however large stocks may be, they will be below the actual requirements of the case. The only question is the means by which the immense quantities which will have to be transported will be conveyed. It is clear that if great precautions are not taken railway plant will make default as in former years. Coal for domestic purposes continues in good demand, and prices are firmly maintained. Official tables have just appeared in illustration of the commerce of Belgium during the nine months ending Sept. 30 this year. The war appears to have made its evil influence greatly felt in September, the exports of Belgian coal having amounted in that month to only 143,996 tons, against 360,647 tons in Sept., 1869, showing a decline of no less than 216,651 tons. The aggregate exports of coal from Belgium in the first nine months of this year still amounted, however, to 2,709,446 tons, as compared with 2,545,859 tons in the corresponding period of 1869. It is expected that when the returns for the whole of this year are made up they will show, however, a decline of at least 600,000 tons as compared with 1869. The loss resulting to the Belgian coal trade from this unfortunate state of things is, of course, very great. The exports of coke from Belgium have also greatly fallen off, having amounted in September to only 37,325 tons, against 57,992 tons in Sept., 1869, showing a difference of about 20,600 tons. For the first nine months of this year the aggregate exports still show, however, an increase of 26,500 tons, as compared with the corresponding period of 1869.

There is not much change to report in Belgian metallurgy. The prolongation of the struggle between France and Prussia causes serious embarrassment, and the future does not present itself under a more cheerful aspect. The question of the Grand Duchy of Luxembourg is also calculated to disturb Belgian metallurgists. It is feared that if Prussia should put her hand upon the Grand Duchy she may prevent the export of minerals from a district which now supplies Belgium with considerable quantities of them. Prussia has an extensive metallurgical industry of her own, and apprehensions are entertained that she may wish to develope it to the detriment of Belgium and France; a prohibition of the free export of the minerals of the Grand Duchy would materially contribute to this result. The aggregate imports of minerals into Belgium in the first three-quarters of this year has just been officially returned at 453,605 tons, as compared with 426,648 tons in the corresponding period of 1869. The total imports of iron of every description into Belgium in the first nine months of this year amounted to 75,433 tons, against 48,249 tons in the corresponding period of 1869. The exports of minerals from Belgium in the first nine months of this year amounted to 136,734 tons, against 124,021 tons in the corresponding period of 1869. The exports of rails from Belgium in September this year amounted to 12,643 tons, against 9971 tons, Sept., 1869; the exports for the first nine months of this year present, however, a falling off, having been 106,532 tons, against 113,717 tons in the corresponding period of 1869. A very notable diminution is remarked in the deliveries to Russia, Turkey, Italy, the United States, the Low Countries, and England; on the other hand, the Zollverein has taken 16,000 tons more Belgian rails this year than last. The exports of plates from Belgium in the first nine months of this year amounted to 18,892 tons, against 16,129 tons in the corresponding period of 1869. Of hammered iron, rolled iron, besides plates, &c., the whole exports from Belgium amounted in the first nine months of this year to 56,932 tons, against 61,949 tons in the corresponding period of 1869. The aggregate exports of Belgian iron of all kinds to all countries amounted in the first nine months of the last two years to the following quantities:—

Destination.	1870.	1869.
Russia	Tons 56,117	Tons 64,332
Sweden and Norway	1,873	733
Denmark	125	621
Zollverein	38,646	28,460
Hanse Towns	2,675	3,743
Low Countries	19,619	26,330
England	10,209	8,968
France	28,827	30,424
Spain	2,953	398
Italy	7,122	14,506
Switzerland	2,809	2,549
Austria	1,197	1,368
Roman States	35	28
Turkey	17,252	27,577
Egypt	1,506	30
United States	8,181	11,116
Cuba and Porto Rico	1,620	691
English Possessions	167	56
Brazil	382	603
Rio de la Plata	754	458
Chili and Peru	436	396
Other destinations	144	312

The aggregate for the first nine months of this year was thus 202,049 tons, as compared with 217,699 tons in the corresponding period of 1869, showing a decrease of 15,650 tons.

There is nothing to report as to the copper market at Havre, that town being just now more pre-occupied with its threatened investment by the Germans than with commercial affairs. At Marseilles, Toka is quoted at 80*l*; Spanish, at 68*l*.; refined Chilian and Peruvian, at 78*l*.; rolled red copper in sheets, 80*l*. per ton. The German copper markets are still extremely quiet; nevertheless, transactions have become a little more numerous. Prices have experienced no material change. There has been no material variation in copper at Rotterdam. The French tin markets—that is, such of them as still remain open—present nothing worthy of record. In Germany an advance is reported in tin. At Rotterdam, Banca has retrograded to 74¼ fls. for disposeable, but at the last dates the article was rather firmer, and holders were asking 75¼ fls. Billiton has been held at 75 fls. At Marseilles, lead in saumons, first fusion, has made 18*l*. 8s; second fusion ditto, 17*l*.; ditto shot, 20*l*.; rolled and in pipes, 20*l*. 16s. per ton. At Rotterdam, Stolberg and Eschweiler lead has made 11 fls. German ditto, of various marks, 10¾ fls. The Breslau zinc market has been in a somewhat stagnant state.

At Czarkow, in the neighbourhood of Pinczow, in the province of Kielce, a rich and inexhaustible bed of pure sulphur has been discovered, and measures are being taken by the Government to work it in a scientific manner. This discovery becomes the more valuable and important as it is believed to be the only sulphur bed in Russia, and will render the empire independent of supplies of the article from other countries for the manufacture of gunpowder; for during the period of the Crimean war very large quantities were purchased at Hamburg and Bremen, and sent to St. Petersburg and Moscow by railway through Germany.

FOREIGN MINES.

CAPE COPPER MINING COMPANY.—John Williams, Nov. 5:—

OOKIEP.—The engine-shaft, during the past month, has been sunk 3 ft. 9 in. without any change to notice. The reason why there is so little ground sunk is in consequence of many holes mis-firing, owing to the safety-fuse being poor, but more especially to the men's own neglect through drink, two of whom we were obliged to discharge. We have about 7 ft. more to sink to be deep enough for a 48 fm. level, which we purpose doing. By so doing it will enable us to prove the run of ore at this (the 48) level several months sooner than we should if we continue sinking the shaft to the 50, which would be a very costly and slow piece of work to do at that depth. Re-set, Nov. 2, to one man and eight labourers, at 70*l*. per fathom, for 1 fm., or the month. The stope in back of the 40, from No. 5 winze, is looking well, and will yield from 8 to 9 tons of copper ore per fathom; ground stoped during the past month, 8 fms. 14 ft.; re-set to four men and nine labourers, at 3*l*. 10s. per fathom, for 20 fms., or the month. The stope in back of the 40, east and west of the flookan course, will yield about 4 tons of copper ore per fathom; ground stoped during the past month, 8 fms. 9½ ft.; re-set, on Nov. 2, to two men and six labourers, at 4*l*. 10s. per fathom, for 12 fms., or the month. The stope in back of the 40, north from No. 4 winze, will yield about 7 tons of copper ore per fathom; ground stoped during the past month, 5 fms. 120 ft.; re-set, Nov. 2, to two men and six labourers, at 3*l*. 10s. per fathom, for 20 fms., or the month. The two stopes in back of the 30, from No. 3 winze, will yield from 7 to 8 tons each per fathom; ground stoped during the past month, 60 fms. 12 ft.; re-set, Nov. 2, to three men and twelve labourers, at an average price of 3*l*. per fathom, for 40 fms., or the month. The stope in bottom of the 20, north from the incline, will yield about 5 tons of copper ore per fathom; ground stoped during the past month, 6 fms. 89 ft.; re-set to one man and five labourers, at 2*l*. 10s. per fathom, for 20 fms., or the month. October extract, 481 tons net, dry weight.

TRIAL MINES.—KOPPERBERG: John Williams, Oct. 16: The adit level, east from Carson's shaft, has been extended during the past month 5 fms. 1 ft. 4 in. The first 3 fms. produced about 1 ton of copper ore per fathom; the last 2 fms. 1 ft. 4 in. were not so good, only producing some very good stones of ore. The end at present is more favourable for driving, yielding some very rich stones of ore, but not in sufficient quantity to value; re-set, Oct. 7, to one man and seven labourers, at 7*l*. per fathom, for 3 fms., or the month. Carson's shaft has been sunk during the past month 5 fms. 5 ft., which has yielded some very rich stones of copper ore; at present it is poor. This shaft is now holed to the back of the adit level about 10 ft. south of the level on the part of the lode which it was driven on. At this point there appears to be a horse of ground standing between the level and the south part on which the shaft was sunk. We have about 9 ft. of ground more to stope to make the shaft good to the bottom of the level. We shall then continue to sink the shaft below, and, judging from the angle of north and south parts of the lode, I think they will come together in about 4 or 5 fms. under the adit level, where we may hope for good results to accrue.

SPRINGBOK.—The shaft below the adit level has been sunk during the past month 2 fms. 1 ft. without any change to notice; it is now 11 fms. 1 ft. below the adit level. We have put the men to drive east and west on the run of ore sunk through, to prove if it will continue. Each end at present will yield from 1 to 1½ ton of very rich copper ore per fathom.

NABABEEP.—The 17, north of Price's shaft, has been extended during the past month 1 fm. 4 ft. 8 in. through ground that has produced some good stones of ore; at this point we cut a regular wall underlying south, and opened east and west on its course 2 fms. 3 ft., which yielded some very good stones of ore, but not sufficient to value; in driving west we shall soon cut a flookan course, and come several fathoms under the former workings, where, I am informed, they raised some good piles of copper ore, but as we are so very short of hands, more especially so at Spectakel, we thought it advisable to suspend all operations here for the present, and send the men to Spectakel, where they will be employed at a greater benefit to the company for the time.

SPECTAKEL.—Capt. Rodda, Oct. 14: The incline is deep enough for the 36. The sumpmen are now engaged in cutting ground for the cistern-plat, and making the necessary preparations from fixing the plunger-lift, which we think will take about two months for this date to complete. The 36, north from the incline, will yield about 4 tons of rich copper ore per fathom. This end is now 4 fms. 4 ft. north of the incline; it is worked by native labourers on day work, directed by the sumpmen, who are working close by cutting plat and cistern-plat for plunger-lift. The 27 east from the flookan course has been extended during the past month 1 fm. 2 ft. 2 in., which has produced some good saving work; at present it is looking kindly, and is very promising for further improvement; this end is now 2 fms. 2 ft. east of the flookan course, and we are in hopes it will prove to be the north mineral course eastward, which I think has already been mentioned in former reports. The 27 south, on the flookan course, has been extended during the past month 1 fm. 2 ft., in ground producing some stones of copper ore, but not enough to value. The stope in the bottom of the 27 has been worked during the past month, by one man and eight labourers, 5 cubic fathoms, at 9*l*. per fathom; this stope will yield about 3 tons of rich copper ore per fathom, which is a little improvement since last report. The stope in the bottom of the 36, which has been worked by two men and eight labourers 16 fms., at 4*l*. per fathom; this stope will yield about 2 tons of copper ore per fathom. The stope in the bottom of Arend's pitch has been worked by two men and eighteen labourers, 15 cubic fathoms, at 6*l*. per fathom, yielding from 2 to 3 tons of copper ore per fathom. A stope in the south side of Arend's pitch is worked by one man and six labourers, 10 cubic fathoms, at 4*l*. per fm.; this stope yields about 2 tons of copper ore per fathom. The stope in the back of the 27, east of Thomas's pitch, will also yield about 2 tons of copper ore per fathom. In the past month this stope has been worked on day pay. In our dressing operations we are using every means to increase our samplings. Things are looking favourable at present. Our extract for September month is 112 tons, net, dry weight.

The superintendent reports that for the present the works at Nababeep are closed, and a portion of the labour engaged at Koperberg has been removed to Spectakel, where they are very short of hands. The returns from Ookiep Mine will not come up to so large an amount as in 1869, but a large quantity of rich dredge ore has already been, and is being, conditioned for smelting works, which will be returned at the close of the year, and handed over, the mine being credited with its value, which will contribute very much to the profit of the year. Mr. Hall, tramway engineer, reports that the arrival of the steel wheels, &c., has enabled him again to push on the plate-laying without stopping general traffic. He has now a good supply on hand of all materials, and anticipates reaching Muishondefontein (forty-six miles) by Christmas. Until that station is reached only twenty-three miles can be used, and the traffic cannot be much increased, owing to the length of country road betwevn the tramway and the mines. Mr. Thielen, the smelting manager, reports that the machinery for the works will be sufficiently completed by about Nov. 15 to start the blast-furnace, which would be followed soon after by work in the reverberatory furnace. Sufficient ore for mixture for one month's work had been carried in from Springbok to Ookiep, where the smelting works are now being established. With the view to economical working, convenient lifts and a short tramway from the ore and fuel heaps to furnaces are being constructed. Mr. Thielen hopes to have the large stack ready by the beginning of December, when he will use the calcining furnaces. When all the ore is calcined he expects to obtain rich metal, and until then only regulus.

TRANSPORT FOR OCTOBER.—To Hondeklip, 319 tons; to Port Nolloth, 328 tons. The bill of lading is forwarded for 673 tons per Glanrafon. [1150 tons have been sold at Swansea by private contract, at 12s. 6d. per unit.]

ALMADA AND TIRITO (Silver).—Clemes Alamos, Nov. 14: Sinking in Providencia going on satisfactorily. Tons of pitanque ore in stock, 25. It is looking well.

FRONTINO AND BOLIVIA.—By advices from Mr. Rouch, dated Oct. 29, just received by the mid-monthly mail, he reports that the Maria Dama and Juan Criollo Mines have both improved, that at the former a cross-cut was being made to a lode which was very rich when the upper part of it was worked some years since, and that at the latter mine a barrow-road had been made to the Cristo lode, and that considerable improvements might be expected in that establishment; and Mr. Rouch adds that the Silencio Mine was also improving, and would give at least 225 ozs. of gold for October, while at the San Joaquin Mine the railroad was progressing, and the mine would pay its costs in the meantime. With regard to Frontino, Mr. Rouch states that, though the Posado and Chuchero levels were poor, and on that account were not being worked, the lode in the Fragua level had during the last few days improved very much; that in the Guia level had widened to 5 ft., and was giving good results; and, lastly, that the long-looked-for Grupero lode had been intersected by the cross-cut commenced about a month since, and that this would probably give entirely new life to the Frontino establishment. Mr. Rouch adds that the Frontino (October) produce would give only about 110 ozs. of gold, but that in consequence of the important discovery just made there was every hope of the mines rising to a degree of prosperity which had not been seen in the company's time.

EXCHEQUER (Gold and Silver).—L. Chalmers, Nov. 21: During the week ending the 19th inst. the air-shaft shift has framed and put in two sets of timbers; they have also been engaged on the face in the main tunnel, and made 2 feet. The windlass shift has raised 293 buckets of water and 71 loads of dirt. The shift in the 80 ft. level has made 8 ft. of drift; this is now in 87 ft. The shift in the 50 ft. level has made 6 feet of drift, besides raising 159 buckets of water; this drift is now in 136 feet.

PACIFIC.—J. Brown, Lander Hill Mine, Nov. 28: In the 550 foot level the ground is favourable for driving, and the end is in a beautiful channel of ground, letting out much water. In the 550 ft. level, north-west of engine-shaft, the ground is favourable in the end. I hope to cut the "break" shortly, when I hope to get softer ground, and make better progress. No lode or branch cut in either end since my last. In the 400 ft. level, west of engine-shaft, the lode in the end is small, and the ground still disordered; from its appearance to-day I think it will improve.—New Shaft: No lode cut. Since I wrote you last I have taken this pare of men and put them in the bottom level north-west to force this end with all speed; I shall resume the sinking of this in a few days

PONTGIBAUD.—Capt. W. H. Rickard, Dec. 1: Roure: The 80 south is in a lode 5 ft. wide, containing a little ore, but not enough to value. We have commenced to cross-cut east a little behind this end towards Virginie's lode, which, being a very important piece of work, will be pushed on with all speed. The rise under Agnes' shaft, in the back of the 80, has entered more favourable ground, and yields a little ore. The rise in the back of the 60, south of Agnes', yields ¼ ton of ore per fathom. The 20 north yields ½ ton per fathom. The adit south yields ½ ton per fathom. The same level north is unproductive. The stollen ends north and south of Paul's shaft are in soft disordered ground. The adit cross-cut, east from the mill, has entered more favourable ground for driving. Our tribute pitches yield pretty well on the whole.—La Grange: The 100, north of Nosky's shaft, yields ¾ ton of ore per fathom; the lode is producing coarse saving work. The tribute pitches in the back of the 80 and 60 metre levels yield a fair quantity of coarse-quality stuff for the laveries.—Mioche: The winze below the adit, on No. 2 lode, opens ground worth ¼ ton of ore per fm. The tribute pitch in the back of the shallow level yields ½ ton of ore per fathom. At Bouzarat the adit level presents no change to notice; the ground is favourable for progress.—La Brousse: The 120 metre level, south of Basset's shaft, yields a little saving work. The 100 south yields ¾ ton of ore per fathom. The 80 south yields 1 ton per fathom. The 60 metre level north, on the eastern branch, yields 1 ton per fathom. The 60 south is in soft unproductive ground. The 40 north is unproductive. The 40 south is suspended, and the men set to rise; the lode is poor. The tribute pitches yield well.—Pranal: The 70 metre level, north of cross-cut, yields ¾ ton of ore per fathom. The same level south yields ¼ ton per fathom. The 50, north of junction, yields stones of lead ore and blende. The same level, south of junction, yields 1¼ ton per fathom. The 50, north of cross-cut, is unproductive. The same level south yields ¼ ton of ore per fathom. The ends of the 30, north and south are poor. The rise from the 30 north is holed to the 8, and opening good tribute ground, worth 1 ton of ore per fathom. The adit south of Boutoux's shaft is in soft, unproductive ground. Our 15 tribute pitches yield satisfactorily, maintaining about their usual production. Surface: Our dressing operations have gone on smartly during the month without any hindrance. The samplings have amounted to 311 tons.—St. Amant, Roche, Savine: The sinking of Susan's shaft below the adit goes on rather slowly, the ground having become harder than last month. The adit north is in a lode 2 ft. wide, showing spots of ore occasionally. The winze sinking from the shallow level is in crushed ground. The shallow trial at Verdier opens a lode 1 ft. wide, in which are found stones of quartz spotted with mundic.

[For remainder of Foreign Mines see to-day's Journal.]

BRITISH RAILWAY REFORM.—In a pamphlet bearing this title Mr. J. H. WATSON, of Holloway, gives the details of his scheme for uniform railway fares, and for a new central metropolitan railway station. He proposes to carry passengers at 1d. third class; 3d. second class; and 6d. first class, for any distance under 10 miles; and 6d., 1s., and 2s. respectively for all distances above 10 miles; and, lastly, 2s. 6d. for second, and 5s. for first class, by express trains. In opposition to the views of all who have had any experience of railway management, he regards season-ticket holders as disadvantageous to the companies, and appears to consider that if it is profitable to carry a man 300 journeys in a year for 15*l*., it is equally profitable to carry any man, although he may travel but one journey a year at 1s. for a single journey, a greater fallacy could scarcely be conceived. Mr. Watson, moreover, in his over anxiety in favour of his own class, assumes that a man desiring to travel from Brighton to London and back in one day would take two single third-class tickets, although they would equal the price of a second class return ticket. His central station would be of no possible advantage beyond that which will be secured by lines already sanctioned. The pamphlet will be read with pleasure by those connected with railway management, and is well entitled to their patronage.

"POST OFFICE DIRECTORY FOR THE SIX HOME COUNTIES."—The reputation of the directories from time to time issued by Messrs. Kelly and Co. is so high that the mere announcement of the publication of a new edition of any of them would suffice to secure them the extensive patronage they so well deserve; but the continually increasing difficulties connected with the preparation of such works, in consequence of the constantly increasing population of the places included, causes much more interest to attach to the comparison of a new edition of any particular directory with that which preceded it. The present edition is edited by Mr. E. R. Kelly, M.A., F.S.S., and no pains seem to have been spared to make the work complete. The additional labour involved in the editing can be well judged of by the increase in the size of the volume. It will be recollected that by the time the Directory had reached its fifth edition its number of pages had increased to 1986, which in the following was further augmented to 2290 pages, whilst the volume now before us has no fewer than 2764 pages. As an instance of the completeness of the information given, it may be mentioned that it is stated, with regard to each parish, in what hundred, union, and county court district, and division of the county, as also in what diocese, archdeaconry, and rural deanery it is situate, and the college and university of every beneficed clergyman have been given as far as they could be ascertained. The Post Office Savings' Banks and Government Annuity and Insurance offices have been noticed, and all other information of local interest has been carefully supplied. As there is for each county a "Street Directory" (if the term can be used for the roads, &c., of the country towns and villages), in which the particulars concerning the place and a list of the inhabitants, whether private or commercial, and a "Court Directory," any information required can be readily obtained, whilst, from testing a large number of addresses, &c., we may state that the particulars appear to be recorded with marvellous accuracy. The volume will prove extremely useful to a large number of persons.

LETTER BOX SIGNALS.—Perhaps nothing more facilitates the rapid delivery of letters than the use of letter boxes, but to ensure accuracy in the delivery it is essential that the postman should have a ready means of ascertaining that the person to whom a letter is addressed has control of the letter box in which it is deposited. Mr. ELLIS LEVER, of Haughton, near Manchester, provides the means of exhibiting the name upon the letter box, and at the same time giving a signal to show that the box has been opened. The invention consists in connecting to the outer frame to which the flap is hinged a bracket carrying a bell or gong, and also a stud or spindle, on which is placed a hammer moved in one direction by a lever acted upon by the flap when the box is opened, and in the reverse direction by a spring or weight. The flap when partially turned acts on the arm or lever, and pulls back the hammer, but when further turned it is released from the arm or lever, and the spring causes the hammer to strike the bell or gong and give the indication that the box has been opened. The bell may be placed in immediate proximity to the letter box, or in any other part of the house or office. To the inside of the flap he hinges a plate, having upon it the name of the proprietor or other person required, which name is exposed when the flap is turned to open the box, and thus the person who delivers the letters can ascertain whether his delivery is correct.

ALKALOIDS FROM COAL TAR.—The invention of Mr. CASTHELAZ, Paris, relates, in the first place, to the extraction of ominline, toulidine, and naphthylamine, or other artificial alkaloids from the crude product or crude paste in which it, or they, is, or are, contained, and for this purpose the inventor employs a liquid hydrocarbon instead of the usual mode of extraction by means of steam or distillation on fire. Any liquid hydrocarbon which evaporates at a low temperature without leaving a residue may be employed, but the inventor prefers to use a petroleum spirit evaporable at a low temperature. The crude paste is to be heated by steam, and mixed with the liquid hydrocarbon, which dissolves the artificial alkaloid, this mixture being stirred up. The solution of the artificial alkaloid in the hydrocarbon collects on the surface of the paste, and is to be drawn off and rectified. This operation is to be repeated two or three times, or as often as may be required, until the artificial alkaloid is completely extracted.

ROOFING TILES.—The invention of Messrs. J. A. WADE and J. CHERRY, Hornsea, consists, first, in the manufacture and use of tiles and flanges, both dovetailed, rabbeted, or undercut, and tapered, combined with rolls or fastening pieces with dovetailed or correspondingly shaped and tapered grooves adapted to lock the tiles together, such tiles being also cut away at the lower part, in order to admit and overlap the next lower course of tiles, and receive the upper ends of the next lower course of rolls or fastening pieces.

TRACTION AND LOCOMOTIVE ENGINES.—The invention of Mr. J. K. LAKE, Chicago, U.S.A., consists in the employment with the main driving-axle, to which the propelling engines are connected, and with the driving-wheels, which are loosely fitted thereon, of friction clutches, for making or breaking the connection with the engine, and in connection therewith it consists in the employment of a secondary set of driving and auxiliary supporting wheels, of smaller diameter than the first, geared down by means of belts or chains, or it may be gear-wheels working on loose drums on the main driving axle, to be connected therewith for transmitting motion, also by friction clutches, the secondary set of wheels being mounted on the frame in supports, wherein they may be vertically adjusted, so as to shift the burthen of the carriage from the primary to the secondary set, or *vice versa*, without interrupting the forward motion of the carriage.

METALLIC ALLOY.—The invention of Messrs. J. JONES and E. R. DUNN, West Bromwich, consists of a new or improved metallic alloy for the bearings or brasses of shafts, axles of carriages, and other rotating bodies, composed as follows:—56 parts by weight of spelter or zinc, 8 parts by weight of copper, and 1 part by weight of tin.

STEAM-ENGINES.—Mr. T. W. WEDLAKE, Romford, Essex, forms by preference, in a single casting, a chamber with a cylinder at either extremity of it. These cylinders are fitted with covers at their outer ends, and a piston is adapted to each cylinder. The pistons are connected together, so that they may move simultaneously, and by a connecting rod or rods they give motion to a cranked axle, the bearings of which are carried by the sides of the chamber, and the crank is contained within the chamber. The outer end of each cylinder has steam alternately admitted to and exhausted from it by valves worked by an eccentric, which is also enclosed in the chamber. The steam is exhausted from the cylinders into the chamber, from whence it may be allowed to escape either into the air or to a condenser. The feed-pump cylinder is fixed to the bottom of the chamber, and the eccentric and rod to work the pump are contained therein.

GAS-ENGINES.—By the invention of Messrs. L. A. L. SODERSTROM and G. A. DICK, Paris, an outlet-valve is applied in addition to the slide-valve, and by the combined use of which the suspension of the loose piston is automatically regulated; and in order to avoid the noise which would otherwise take place from the air rushing out of the outlet-valve, a closed or partly closed air-chamber is applied, into which the valve opens. A rod is fixed to the loose piston, and passes through the valve and air-chamber, so as to indicate from the outside the movements of the loose piston, and to facilitate the rapid opening and shutting of the outlet-valve.

THE EDUCATION MOVEMENT.—On Monday, the Lord-Lieutenant of Warwickshire, Lord Leigh, presided at the College, Binswood, Leamington, on the opening of the new boarding-house, which now forms the western side of the quadrangle of the extensive building, in this fashionable inland watering place. The head-master, the Rev. H. G. Woods, Fellow and Tutor of Trinity College, Oxford; J. R. Thursfield, B.A., Fellow and Tutor of Jesus College, Oxford; and other well-known educationalists took part in the proceedings. A number of scholarships were awarded to the most successful students; the annual speeches made, and prizes given.

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